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Peculiar Spur of *Impatiens nubigena* W.W. Sm. (Balsaminaceae)

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Impatiens nubigena W.W.Sm. has the most unique flower in *Impatiens*. Spur of the lower sepal is intruding into the inside of the lower sepal. A detailed description of this unique flower is given.

In the course of our study of *Impatiens* in Yunnan, China, we had a field research in NW Yunnan, 1994. At that time we had an urge to collect *Impatiens nubigena* W.W.Sm. (Fig. 1), which is known to be distributed in NW Yunnan and SW Sichuan (Chen 1978).

In the original description Smith (1914) wrote about the lower sepal: "... Labelli limbus 6–7 mm. longus, scaphiformis, horizontalis, subtus medio inter basin et apicem acutum calcare vestigiali vix 1 mm. longo, ut videtur incluso praeditus..." This description means that the spur of the lower sepal is vestigial and is hardly beyond 1 mm long and that the spur seems to be included. However, "the included spur" is quite difficult to image. This type of spur (i.e., included) is not reported from China (Hooker 1908, Handel-Mazzetti 1933), Himalaya (Hooker 1904–06) nor other regions (Grey-Wilson 1980).

At Bi Ta Hai near Zhongdian (Chungtien) we could collect this species and observe flowers in detail. In 1995 we had a chance to examine the isotype specimen of *I. nubigena* at Kew. This paper aims to report the structure of this unique flower and give a detail description of it.

Observation

Impatiens nubigena was found on moist place among scrubs on the margin of *Picea* forest. The flowers are solitary or two in a short inflorescence coming forth from the axil of upper leaves. The shape of lower sepal is navicular, like *I. serrata* Benth ex Hook. f. & Thomson and *I. occultans* Hook. f. from Nepal (see Akiyama et al. 1991), but indeed the spur shape is unique. It is quite remarkable that the spur is not excluded, but sprouting up to the inside of the lower sepal and that there is a hole on the midrib of the lower sepal in the outside view (Figs. 2, 3). The spur observed in all flowers is constant in form and this character is stable. It is pointed out that the extraordinary range of variation in the lower sepal is closely related to the pollination and evolutionary processes at work within the genus (Grey-Wilson 1980). In the field we could observe some insects visiting the flowers (Fig. 4), but it is uncertain whether it secretes nectar or not. The meaning of this included spur in the view of adaptation is still unclear.

Except for the spur the flower is similar to those of *I. serrata* and *I. occultans* as mentioned above in having the superfluous bract on the pedicel and the

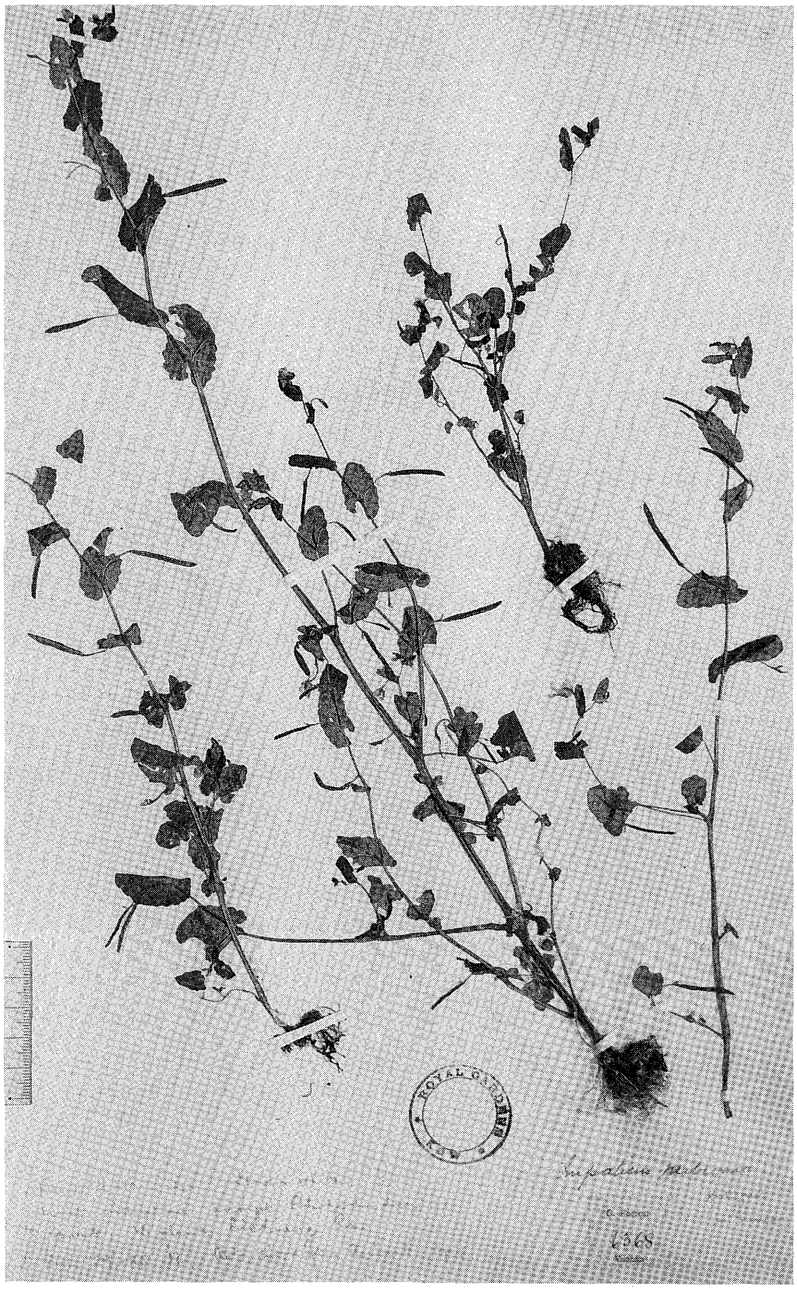

Fig. 1. *Impatiens nubigena* W.W.Sm. (Western flank of the Lichiang Range, G. Forrest 6368, K, isotype).

navicular lower sepal. However, *I. nubigena* is quite different from other species and can be distinguished even in the sterile stage by dimorphic leaves; petiolate broadly ovate or rhombic lower leaves and sessile amplexicaul upper leaves.

Impatiens nubigena has been collected in several localities in NW Yunnan and SW Sichuan, this region is regarded as having high endemism of *Impatiens*

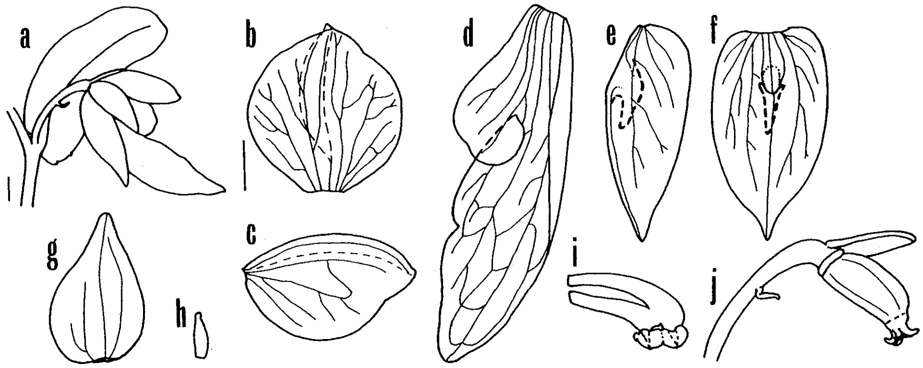

Fig. 2. Flower of *Impatiens nubigena* W.W.Sm. (S. K. Wu et al. 1001, KUN, TI). a: Flower from axil of upper leaf. b, c: Dorsal petal (b: opened; c: lateral view). d: Lateral united petals. e, f: Lower sepal with included spur (broken line) (e: lateral view; f: back view). g, h: Lateral sepal (g: outer; h: inner). i: Stamens. j: Ovary with pedicel and superfluous bract. Bars indicate 1 mm.

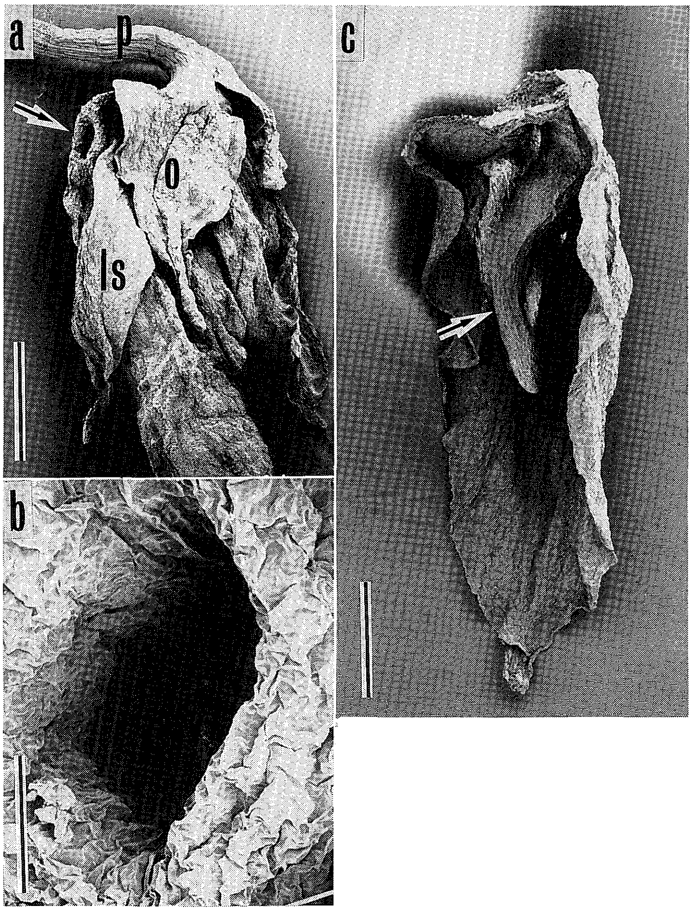

Fig. 3. Lower sepal and spur (S. K. Wu et al. 1001, KUN, TI). a: Lateral view of lower sepal (ls: lower sepal; o: outer lateral sepal; p: pedicel). Arrow indicates a hole on the midrib of the lower sepal. Bar indicates 1 mm. b: Hole. Bar indicates 0.1 mm. c: Inside view of the lower sepal. Arrow indicates the spur sprouting up to the inside of the lower sepal. Bar indicate 0.5 mm.

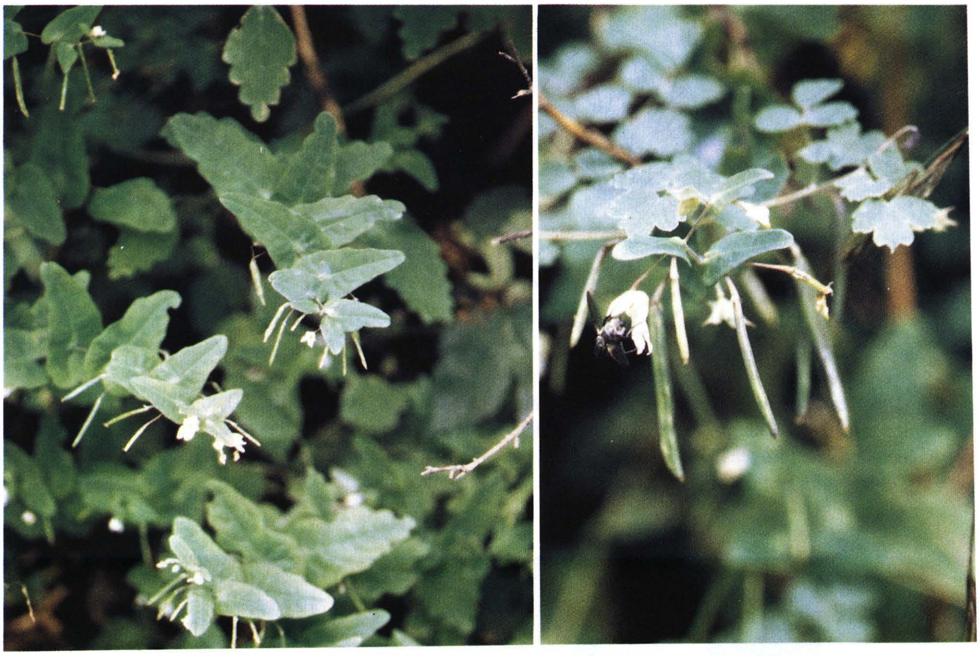

Fig. 4. *Impatiens nubigena* W.W.Sm. with white flowers and young fruits. An insect visits a flower (right). At Bi Ta Hai, Yunnan, China (19 Sept. 1994).

species (Akiyama et al. 1995).

Description of Flower

Flower solitary, axillary or two flowers in a short axillary inflorescence, opening under the subtending leaf, white, not flattened. Pedicel ca. 3 cm long, glabrous, with a superfluous bract at base of flower. Bract narrowly ovate, ca. 2 mm long. Lateral sepals four (two pairs); the outer ones larger than the inner, ca. 3 mm long, ovate; the inner ones minute, membranaceous, ca. 1 mm long, oblong. Lower sepal white, ca. 4.5 mm long, ca. 1.5 mm deep, navicular, with included spur; spur ca. 1.5 mm in overall length, curved downward. Dorsal petal white, ca. 3.5 mm long and wide when flattened, cucullate, without a crest-like appendage. Lateral united petals white, ca. 7.5 mm long; upper lobe ovate, ca. 3.5 mm long, ca. 1.5 mm wide; lower lobe elliptic, ca. 5 mm long, ca. 2 mm wide. Stamens 5, anthers without appendage. Fruits linear ca. 2–2.5 cm long.

Specimens examined: Lijiang Xian (Lichiang): Western flank of the Lichiang Range, Lat. 27°25'N, 12000 ft. (G. Forrest 6368, K, isotype); Yulongshan, 3650–4000 m (H. Ohba et al. 875, 17–26 Sept. 1987, fl., fr., KUN, TI). Zhongdian Xian: 35–3800 m (Zhongdian Dui 1021, 11 Aug. 1962, fl., KUN); Haba, 3600 m (Zhongdian Dui 1375, 26 Aug. 1962, fl., KUN); Bi Ta Hai, 3470 m (S. K. Wu et al. 1001, 19 Sept. 1994, fl., young fr., KUN, TI). Deqin Xian [Atuntze]: 2700 m (C. W. Wang 70143, Sept. 1935, fr., KUN); Paimashan, Napongniu, 4050 m (T. T. Yü 9375, 4 Aug. 1937, fl., young fr., KUN); Mt. Paimashan, Kuchianung, 3500 m (T. T. Yü 9395, 8 Aug. 1937, KUN).

Endnote

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秋山　忍，大場秀章，武　素功：***Impatiens nubigena* W. W. Sm. の特異な距**

中国雲南省西北部と四川省西南部に分布する *Impatiens nubigena* W. W. Sm. は，原記載によれば，下萼片の距が萼片の内側にあるようにみえるという．このような内向的な距をもつツリフネソウ属の種は他にまったく知られておらず，常識的にもにわかには信じ難いものである．しかし，その後このツリフネソウについての研究はなく，その詳細な形態については不明なままであった．ツリフネソウ属の研究を進める上で，その実体を是非とも知りたいと念願していたところ，1994年に中国雲南省西北部中甸付近にて，この種を採集し，その花の形態を詳細に調べることができた．また，1995年にキュー植物園標本館にてタイプ標本の検討を行った．

下萼片の距は，通常外側に伸長しているのに対して，確かに本種では内側に距がある．従って，下萼片を外側からみると，距の位置する場所には孔があり，内側から見ると明らかな距が観察できる．このように内向的な距の形態は，上に述べたようにツリフネソウ属において非常に特異なものである．ツリフネソウ属において，下萼片および距の形態は送粉昆虫との関係において重要な意味をもつと考えられている．そこで，本種で蜜が分泌されているか否かおよび蜜の分泌部位を確認したかったが，これについては断言しえるようなデータは得られなかった．この内側にある距が送粉昆虫に対してどのような意味をもつかは興味深い点であり，今後さらなる検討を行なう予定である．

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